The Sectoral Solution to Climate Change

Building and Construction

In 2022, the Buildings and Construction sector accounted for **37 per cent of global operational energy and process-related CO_2 emissions**, rising to just under 10 Gt CO_2. Its energy consumption reached **132 exajoules**, more than a third of global demand (UNEP, 2024).

According to the IPCC, building sector mitigation policies can reduce greenhouse gas (GHG) emissions by up to **90 per cent in developed countries** and up to **80 per cent in developing countries**, and help lift **2.8 billion people** in developing countries out of **energy poverty** (IPCC, 2022).

It is not possible to achieve the Paris Agreement goals without decarbonizing this sector. The climate impact of buildings is likely to increase in the coming decades due to rapid growth, especially in **urban areas in the global south**. For example, **70 per cent of the buildings** projected to exist in 2040 in Africa have **not yet been built** (IEA 2019).

Buildings and infrastructure not only contribute to climate change, but are also **vulnerable to its impacts**, whether it's hurricanes, flooding, sea level rise, and heatwaves. With more frequent and severe climate-related events, the world must adopt climate-resilient building practices to reduce vulnerabilities, particularly in areas experiencing rapid urban growth.

Buildings of the future need to be decarbonized along their lifecycle and be **increasingly resilient** to extreme weather events and natural disasters. The built environment is a large part of most economies, accounting for 11-13 per cent of global GDP. Green buildings present large investment opportunities, worth an estimated $24.7 trillion by 2030 in emerging market cities (IFC, 2019).

Key messages

- According to the Global Buildings Climate Tracker, the gap between the current state and the desired decarbonization path is significant. The buildings and construction sector remains off track to achieve decarbonization by 2050.
- Buildings energy-related energy demand represents around **27 per cent of global emissions** in 2022 and a further 7-9 per cent is estimated to be due to the manufacturing of buildings materials.
- A typical building already standing or being constructed today will still be in use in 2070 and beyond, but the climate it encounters will have changed significantly (GlobalABC, 2021). Rising global temperatures and extreme weather necessitate **increased adaptation** and resilience in building design and operations.
- Investment in building decarbonization exceeded **US$285 billion in 2022** but is expected to decline in 2023, largely due to a less favorable investment environment due to rising costs.
- The renewable share in final energy demand in buildings has increased by only 1 percentage point since 2015. To get on track, the **share of renewable energy** should increase by **1.5 percentage points every year until 2030**.
- More progress is required on global adoption of **mandatory building energy codes** and for existing codes to align to zero emissions. Since 2021, there have been 17 national code updated or newly developed mandatory national building energy codes. By 2022, only 3 countries have energy codes aligned with zero emission building (ZEB) concepts.

Key recommendations (UNEP, 2024):

- Countries should develop ambitious and comprehensive **Climate Action Roadmaps for the sector by 2030** and use them in submitting and revising a new cycle of national climate action plans (NDCs).
- Developing **building codes aligned with Zero-Emissions Building** (ZEB) principles and ensuring the adaptability of new and existing structures to the changing climate.
- **Increasing the rate and impact of retrofitting existing buildings for energy efficiency**, from the current 1 per cent to 5-10 per cent per year.
- Adopting **passive design measures** for all new buildings.
- **Collecting data**, via tools such as Building Passports.

SHOUT
SHARE
IT

Further Reading

Global Status Report for Buildings and Construction

Global and regional building decarbonization roadmaps

Building Materials And The Climate: Constructing A New Future

NDC Guide for Buildings and Construction

10 Key Measures to decarbonize buildings

NDC Guide for Buildings and Construction

Buildings Passport Guide

A Practical Guide to Climate-resilient Buildings & Communities

Guide to buildings and climate change adaptation

UNEP contact:

Jonathan Duwyn:
Jonathan.duwyn@un.org

- **Financial incentives** for greater investment in decarbonizing the buildings and construction sector, including in innovation and a shift to reuse, circularity, natural/ bio-based materials, or green mortgages offered by banks: **Investments to decarbonization are expected to fall** across 2023 as households and businesses face higher borrowing costs and builders face higher costs of construction in labour and materials.
- Companies in the sector are also encouraged to develop **a sound understanding of their social impacts**, by incorporating equity and diversity standards into their work.
- **NGOs can raise awareness** of buildings' role in climate change and advocate for policy changes towards inclusive and sustainable design approaches.

Key data

- By 2050, 1.6 billion people living in more than 970 cities will be regularly exposed to **extreme high temperatures** new: (UNEP, 2021).
- By 2030 heat stress could cause estimated global economic losses of **US$ 2.3 trillion due to the demand for cooling**, posing serious health threats to citizens and further exposing infrastructure new: (UNEP, 2021).
- **Between nine and 30 jobs are created for every $1 million invested in renovation and new construction**, one of the highest rates across all sectors new: (UNEP GlobalABC, 2020).
- In developing economies, **construction materials are set to dominate resource consumption**, with associated emissions expected to double by 2060 (UNEP, 2023).
- Globally, investing **US$100 million annually in street trees** would give 77 million people a 1°C reduction in maximum temperature on hot days. Urban trees in 10 of the world's megacities would generate **US$482 million in health cost savings** as a result of the reduction in pollutants new: (UNEP, 2021).
- **Infrastructure is responsible for 88 per cent** of the forecasted costs **for adapting** to climate change. (UNEP source).
- **Climate-resilient infrastructure investments** in low- and middle-income countries could produce roughly **US$4.2 trillion in total benefits:** around US$4 for each dollar invested (World Bank 2021).